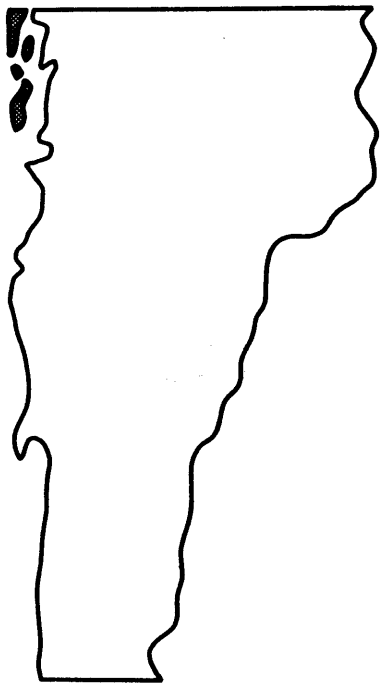
FLOOD INSURANCE STUDY

TOWN OF GRAND ISLE, VERMONT
GRAND ISLE COUNTY



JUNE 3, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER - **500223**

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
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1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Grand Isle, Grand Isle County, Vermont, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the U. S. Geological Survey (USGS) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 20. This work was completed in October 1986.

1.3 Coordination

On February 13, 1985, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives from FEMA, the town, and the USGS (the study contractor) to determine the streams to be studied by detailed methods. During the course of the work by the USGS, flood elevations and flood boundaries were review with community officials. An intermediate CCO meeting was held on October 28, 1986, to review the study in progress.

On March 19, 1987, a final CCO meeting was held with representatives from FEMA, the town, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Grand Isle, Grand Isle County, Vermont. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by Lake Champlain was studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through October 1991.

The following flooding sources were studied by approximate methods: Pearl Swamp and various unnamed tributaries. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Town of Grand Isle.

2.2 Community Description

The Town of Grand Isle is located in southern Grand Isle County in Vermont. It is bordered by the Town of North Hero to the north, the Town of South Hero to the south, and Lake Champlain to the east and west. The town has an area of approximately 38.9 square miles and a population density of approximately 32 persons per square mile. The town had a population of 1,238 in 1984 (Reference 1).

Lake Champlain is Grand Isle's principal water body. Continued economic development in the Lake Champlain lowlands is expected and pressures leading to floodplain use will accompany such development.

The climate of Grand Isle is moderate and is characterized by the even distribution of an average of approximately 36 inches of precipitation during the year. The town experiences large ranges of temperature both on a daily and an annual basis and a considerable variety of weather in short periods of time (Reference 2).

The topography of the town ranges from gently rolling terrain in the valleys and lowlands to steep hilly terrain in several upland areas. The land area of the town consists mainly of well drained, glacial, stratified drift in the valleys and glacial till and bedrock in the uplands.

The maximum elevation observed at USGS gaging station No. 04295000 on Lake Champlain (the Richelieu River) at Rouses Point, New York, for the period of record from March 1871 to October 1986, was 101.80 feet on March 30, 1903. The maximum elevation known since at least 1827 was 102.1 feet on May 4, 1869, from marks at the railroad bridge near the present gaging station (Reference 3).

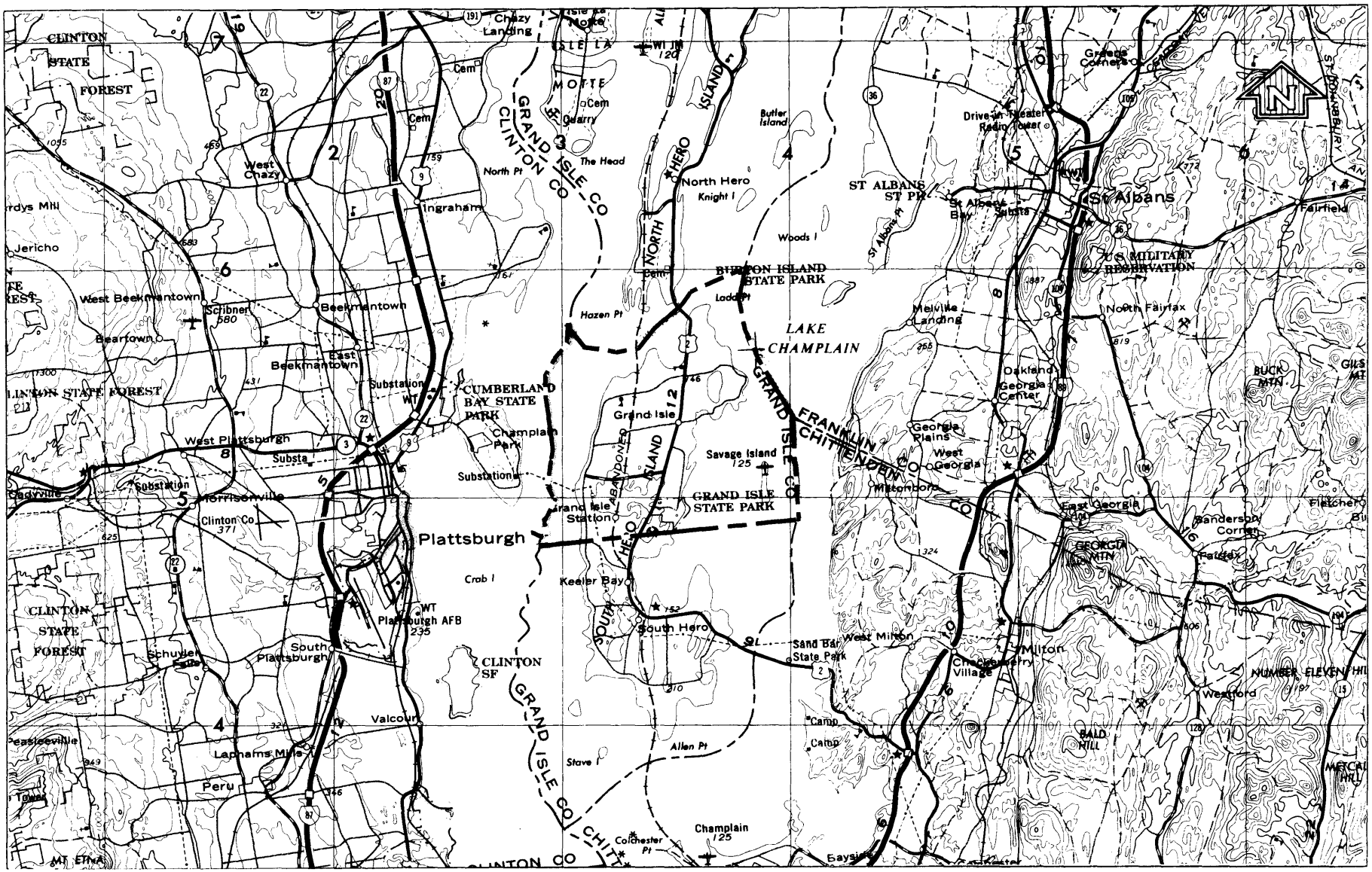


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF GRAND ISLE, VT

(GRAND ISLE CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

2.3 Principal Flood Problems

Floods in Grand Isle have occurred in every season of the year. Flooding in the spring is common and is caused by rainfall combined with snowmelt. Floods in late summer and fall are usually the result of above normal precipitation. Winter floods result from occasional thaws, particularly in years of heavy snow cover.

2.4 Flood Protection Measures

There are no flood protection measures existing at the time of this study that affect flooding along Lake Champlain in Grand Isle.

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. A flood event of a magnitude which is expected to be equaled or exceeded once on the average during any 100-year period (recurrence interval) has been selected as having special significance for floodplain management and for flood insurance rates. This event, commonly termed the 100-year flood, has a 1 percent chance of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Analyses were carried out to establish the peak elevation-frequency relationships for the flooding source studied in detail affecting the community.

Elevations of the selected recurrence interval were obtained from a recent report on Lake Champlain (Reference 4). The flood elevations determined for Lake Champlain were based on a log-Pearson Type III distribution of annual peak elevation data (Reference 5). The principal source of data were records of water levels as recorded at USGS gaging station No. 04295000 on Lake Champlain at Rouses Point, New York, for the period from 1871 to 1986 (Reference 3).

The 100-year flood elevations determined for this study are shown on the Flood Insurance Rate Map (Exhibit 1).

The stillwater elevation for the 100-year flood has been determined for Lake Champlain and is summarized in Table 1, "Summary of Stillwater Elevations."

TABLE 1 - SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet) 100-YEAR
LAKE CHAMPLAIN	
for its entire shoreline within community	102.0

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100-year floodplain boundaries to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. For Lake Champlain, the 100-year floodplain boundaries were delineated using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (Reference 6).

For the streams studied by approximate methods, the 100-year flood boundaries were delineated using the Flood Hazard Boundary Map for the Town of Grand Isle (Reference 7).

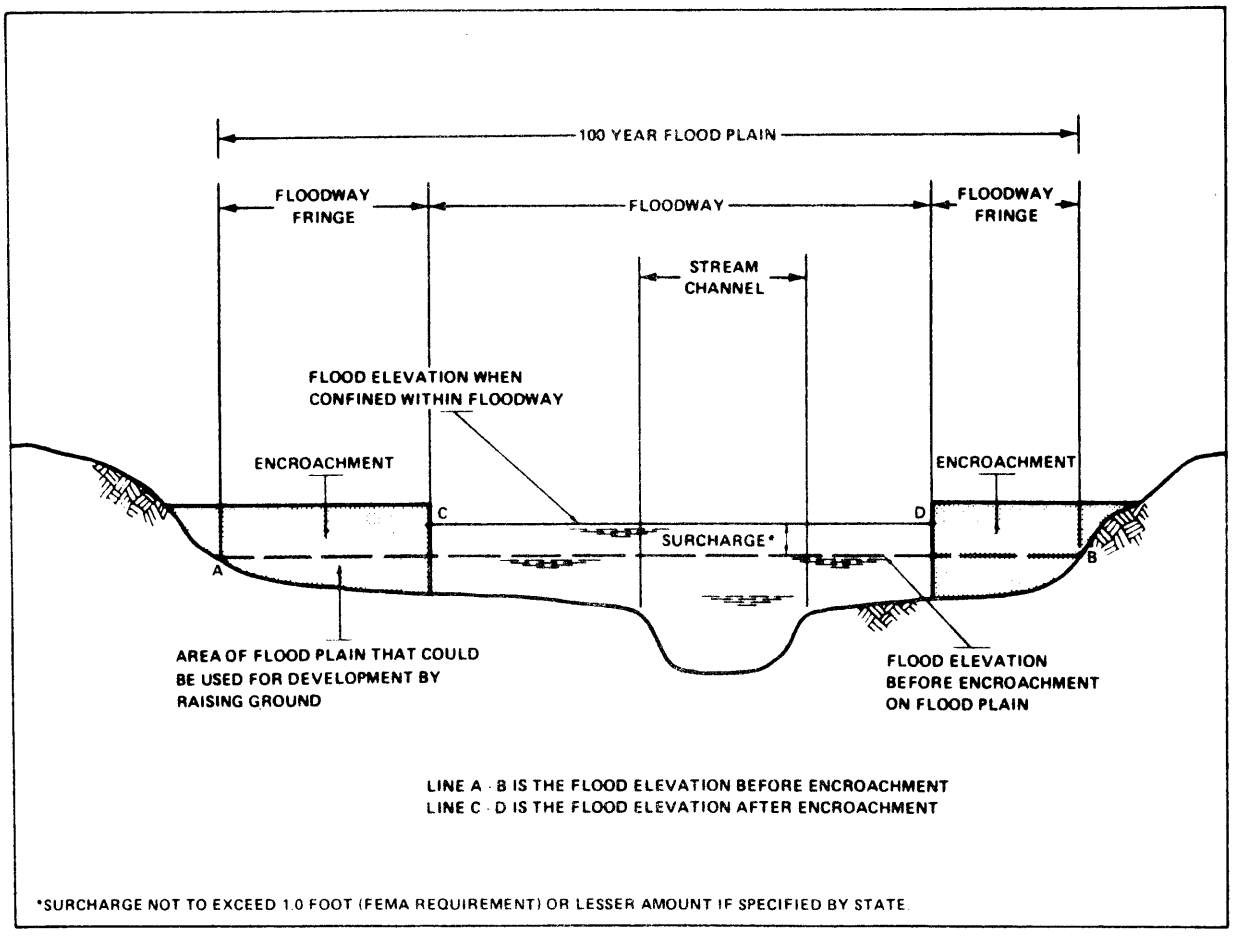
The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in

flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.



FLOODWAY SCHEMATIC Figure 2

No floodways were calculated as part of this study.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100-year floodplain. The locations of selected cross sections used in the hydraulic analyses are shown where applicable.

7.0 OTHER STUDIES

Flood Insurance Studies for the Towns of North Hero and South Hero have been published (References 8 and 9). The results of this study are in agreement with the results of those studies.

Due to its more detailed analyses, this study supersedes the Flood Hazard Boundary Map for the Town of Grand Isle (Reference 7).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

9.0 BIBLIOGRAPHY AND REFERENCES

1. National Survey, 1984 Vermont Yearbook, Chester, Vermont, 1985.

2. U. S. Department of Commerce, National Oceanic and Atmospheric Administration, Climatological Data, New York, Asheville, North Carolina, National Climatic Center, 1976-1980.

3. U. S. Department of the Interior, Geological Survey, National Water Data Storage and Retrieval System, Peak Flow File, Reston, Virginia, August 1979.

4. The International Champlain-Richelieu Board, Report to the International Joint Commission, Regulation of Lake Champlain and the Richland River, Vermont, 1977.

5. Water Resources Council, "Guidelines for Determining Flood Flow Frequency," Bulletin 17A, Washington, D. C., June 1977.

6. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet: North Hero, Vermont-New York, 1972; South Hero, Vermont-New York, 1966.

7. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Town of Grand Isle, Grand Isle County, Vermont, March 25, 1977.

8. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Town of North Hero, Grand Isle County, Vermont, Washington, D. C., August 15, 1980.

9. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Town of South Hero, Grand Isle County, Vermont, Washington, D. C., June 15, 1978.

EXHIBIT 2 - ELEVATION REFERENCE MARKS

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	10	145.74	Approximately 0.84 mile north along State Route 314 (West Shore Road) from intersection with Bellhill Road, on east side of road, on northeast corner of concrete guardrail, chiseled square.
RM 2	10	100.04	At Hoyt Bay, 500 feet west of Hoyt Point, 75 feet east of Town Highway 7 in South Hero, 1,200 feet south of Bay View Road, spike and washers in 12-inch elm tree.
RM 3	10	154.78	110 feet south of intersection of East Shore South and U. S. Route 2 along U. S. Route 2, in south end of east headwall of large culvert, Standard USGS Tablet "W09 1938 Reset 1973".
RM 4	10	169.11	At southeast corner of intersection of U. S. Route 2 and East Shore North, on northeast corner of masonry culvert headwall, chiseled square.
RM 5	15	117.47	At northeast corner of U. S. Route 2 bridge at Sandy Point, Standard Tablet "Reset 1950 117 1964".